BENEFIT/COST ANALYSIS:

LINE ROAD

HEARTS DELIGHT TOWARDS CARBONEAR

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1.0 INTRODUCTION

This benefit/cost analysis of the Line Road is based on the traditional components of transportation economics. Accordingly the benefits portion will include changes in vehicle operating costs, time savings, accident reductions, and consumer surplus. The cost section will include capital cost of construction, the additional ongoing maintenance costs required by the new link, and the future salvage value at the end of the life of the facility.

2.0 CONSTRUCTION COST

The upgrading of the Line Road to an RLU 70 standard would cost $150,000 per kilometre for a gravel surface road and $300,000 per kilometre for a paved roadway. Approximately 20 kilometres of roadway would be required for a total cost of $3 million for the gravel road and $6 million for the paved road.

Reasonably a cash flow of $1 million per year could be allocated to the Line Road. On this basis the Net Present Worth of the construction, using the Treasury Board approved discount rate of 10%, would be $2,735,537 for the gravel road and $4,790,786 for the paved road. These are 1985 dollars.

3.0 MAINTENANCE COSTS

The average cost per kilometre for road maintenance in District One in fiscal year 1983/84 was $5,724 per kilometre for gravel roads and $6,106 per kilometre for paved roads. The annual maintenance cost for the Line Road constructed to a gravel surface would be $114,480 and would be $122,120 for a paved surface.

Each facility is assumed to have a service life of 15 years without additional major capital improvement. The maintenance costs over this time frame will have a Net Present Worth of $957,820 for a gravel road and $1,021,742 for a paved road.

4.0 SALVAGE VALUE

At the end of the facility life a residual value will remain from the investment in right of way, mass earth movement, some structures, and potentially some areas of sub grade. This value is assumed as 10% of the capital construction cost of the gravel roadway and 20% of the capital construction cost of the paved roadway as the pavement should greater protect the subgrade.

The Net Present Worth of the salvage value is estimated as $78,999 for the gravel roadway and as $315,998 for the paved roadway.

5.0 COST SUMMARY

To summarize the cost aspects of constructing the Line Road the salvage value must be subtracted from the total of the construction and maintenance costs. A gravel RLU 70 would have a Net Present Cost of $3,614,358 while the paved version would have a Net Present Cost of $5,496,530.

6.0 POTENTIAL USE OF LINE ROAD

In 1982 the annual average daily traffic (AADT) on Route 74, the Hearts Content Barrens Road, at the junction of Route 80 was 453 vehicles. In 1979 a classification count revealed 15% transport trucks and 25% single unit trucks. A 1979 study on Route 80 near Cavendish revealed a passenger vehicle occupancy of 2.5, a single unit truck occupancy of 2.1., and a transport truck occupancy of 1.3 persons.

Updating these data is possible by growthing the AADT by 2% for 1983 and by 1% for each of 1984 and 1985 to reflect present conditions. Future traffic growth, based on the Role of the Mode study recently jointly completed by Transport Canada and Newfoundland Transportation, would be based on an annual growth rate of 3.5%.

Since the 1985 AADT of 471 on Route 74 represents potential interaction between Carbonear and all communities

along Route 80 between Greens Harbour and Lead Cove a method is required to determine the vehicles which could be diverted to a newly constructed Line Road. A simple gravity model, assuming interaction between communities is related to the product of their populations divided by the square of the intervening distance, can be employed to determine the percentage contribution of each community to the traffic flow on Route 74. Table 6.1 documents this approach. Population figures are 1981 data available from the Newfoundland Statistics Agency while highway distances are available from the Provincial highway inventory.

TABLE 6.1

GRAVITY MODEL ANALYSIS

COMMUNITY	(P_2) POPULATION	(D) DISTANCE TO CARBONEAR	$P_1*P_2/D*D$	%
Lead Cove	95	54.8	169	0.5
Sibleys Cove	189	53.5	352	1.1
Brownsdale	199	51.5	400	1.2
New Melbourne	123	48.5	279	0.8
New Chelsea	144	42.5	425	1.3
Hants Harbour	542	39.0	1901	5.8
Winterton	753	28.5	4946	15.1
Turk's Cove	61	24.5	542	1.7
New Perlican	350	23.3	3439	10.5
Hearts Content	625	18.0	10291	31.3
Hearts Desire	416	28.8	2676	8.2
Hearts Delight	899	34.1	4125	12.6
Cavendish	343	41.2	1078	3.3
Whiteway	291	47.0	703	2.1
Greens Harbour	785	52.8	1502	4.6
Carbonear	5335(P_1)	-	-	-

Diversion to the Line Road would only occur if both time and distance were shorter than the existing Route 74. Travellers from the communities of Hearts Content and northerly would continue to use the shorter Route 74. Travellers from Hearts Delight southerly would use the shorter Line Road. Travellers from Hearts Desire would face 28.8 paved kilometres via Route 74 to Carbonear versus 25.2 via a paved Line Road. Should the Line Road be gravel a penalty of 6.7 kilometres would be applied to account for a 60 km per hour travel speed as versus 80 km per hour on pavement. Accordingly for the gravel condition Hearts Desire travellers are unlikely to use the Line Road as the distance to travel would equate to 31.9 kilometres.

The number of vehicles diverted to the Line Road would be 22.6% or 106 on a gravel road and 30.8% or 145 on a paved road.

Latent demand for improved access to Carbonear also exists. The shortening of the distance will increase travel relative to the amount of distance saved. Incorporating the new distances into the gravity model gives the following results:

COMMUNITY	(P_2) POPULATION	(D) NEW DISTANCE TO CARBONEAR	$P_1*P_2/D*D$
Hearts Desire	416	25.2	3495
Hearts Delight	899	20.0	11990
Cavendish	343	27.2	2473
Whiteway	291	33.6	1426
Greens Harbour	785	38.8	2782

The total interaction predicted by the gravity model for the communities affected by a gravel Line Road increases from 7408 to 18671. The percentage increase of 152% represents the latent growth in traffic or 161 vehicles in 1985. Similarly the interaction predicted for the communities affected by a paved Line Road increases from 10084 to 22166. The percentage increase of 120% represents a latent growth in traffic of 174 vehicles in 1985.

7.0 VEHICLE OPERATING COSTS

Both distance travelled and type of road surface affect the various components of vehicle operating cost such as fuel consumption, oil consumption, tire wear, and roadway related vehicle depreciation. The Priority Planning System maintained by the Ontario Ministry of Transportation and Communications provides an accurate computer analysis of these data.

The benefits which would accrue to the present 106 users of Hearts Content Barrons Road who would divert to a gravel standard Line Road are estimated to have a net present value of $1,362,045. The 145 users who would divert to a paved Line Road would have an estimated net present value of vehicle operating cost saving of $2,213,348.

8.0 TIME SAVINGS

Assuming a time value per person in an automobile to be worth $3.60 per hour, the time value for a single unit truck to be $12.60 per hour reflecting both the driver and the helper, and the time value for a transport truck to be $11.70 per hour the Priority Planning System calculates the value of time saved.

For a gravel line road the saving is $524,206 while for a paved road the saving is $880,493.

9.0 ACCIDENT COSTS

The reduction in length of road travelled results in accident savings. For a gravel road the benefits are estimated at $39,984 while the paved road would generate $43,235 in benefits.

10.0 CONSUMER SURPLUS

The value of the trip to the latent traffic generated on the Line Road is shown by transportation economy literature to be one half of the operating costs of the vehicles on the system prior to construction.

On this basis the gravel road would generate trips valued at $469,406. The paved road would generate trips valued at $501,389.

11.0 BENEFIT SUMMARY

A gravel Line Road would generate $1,362,045 in vehicle operating cost savings, $524,206 in time savings, $39,984 in accident savings, and $469,406 in the value of new trips.

A paved Line Road would generate $2,213,348 in vehicle operating cost savings, $880,493 in time savings, $43,235 in accident savings, and $501,389 in the value of new trips.

12.0 BENEFIT/COST SUMMARY

Dividing the identified and quantified benefits by the estimated cost produces a benefit/cost ratio of 0.66 for the gravel road standard and 0.66 for the paved road standard. In neither case can the construction of the Line Road be justified at this time on the basis of transportation economic factors.

13.0 COST EFFECTIVENESS

The cost of a gravel standard road exceeds the benefits by 1.2 million dollars while the cost of the paved standard exceeds benefits by 1.9 million dollars.

The residents of Trinity Bay South identified a number of factors to support the construction of the new road. The safety aspects, shorter distance, and commuting for employment, education, recreation, banking, and shopping services have been accomodated in the transportation economy exercise.

Emergency trips to Carbonear hospital and from the RCMP detachment at Harbour Grace have not adequately been included since loss of life would potentially be involved.

Within the constraints of a provincial budget no new jobs would be created by construction or maintenance of the road. Such a situation would only be valid if new Federal funding were earmarked for the road.

The analysis is unable to account for the change in land values associated with the provision of transportation access to lands not so previously served. Recreational, commercial, and residential properties would certainly appreciate in value. While these benefits can be recognized in the abstract few flow back into the provincial treasury to offset the cost of the roadway.

14.0 CONCLUSION

From a transportation economy standpoint the construction of the Line Road is not recommended. Should speed of emergency service and local land use development merit an investment of 1.2 million dollars the gravel standard is recommended. Should these considerations value 1.9 million then a paved standard is recommended.

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